ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-WSEB-6-6 1997

Proposing to Create a New Public Water System

The purpose of this document is to identify factors that are important when proposing to create a new public water system. Where town water service is needed, DES recommends extending an existing nearby municipal water system, wherever possible, rather than building a "stand-alone" system. The extension option is typically much less costly and is operationally much more efficient. In many cases however, such an option is not available.

Principal Activities in Creating a District

In recent years most new governmental water systems in New Hampshire have been established as separate water districts or precincts rather than a direct component of town government. See Chapter RSA 52 for detailed procedures for establishing districts. Typical activities in forming a district include:

1. Ten or more voters petition the selectmen to establish a district for providing pubic water service.
2. Selectmen, possibly with the assistance of a local committee, prepare a plan showing possible district boundaries.
3. Public meetings are held to receive comment on tentative boundaries and the wording of the proposed warrant articles.
4. After appropriate notice and hearings, a formal vote is taken to see if the district will be established.

Duration and Schedule of Activities

The water system project could take 3-4 years from concept discussion to system start-up assuming ownership by a district or town. If owned by a city or private regulated utility the time-frame should be less. Shown below is a brief summary of the process and sequence of the activities that could take place during this period.

Initial Action. Identify the needs or special benefits that a public water system would provide. Develop a cadre of supporters, prepare proposed warrant articles and boundary maps to be presented at the town meeting. This would take up most of the first year.

Organization. Assuming the district is created, the district Board of Commissioners would likely schedule a meeting soon thereafter. At that time the voters of only the district will need to select a district name, develop procedural rules, retain clerical, accounting and technical support,

appropriate funds to allow the district to function and authorize a preliminary engineering study of the proposed water system. This would begin the second year of activity.

Final Planning. Assuming completion of the engineering study, the Board would likely return to the voters seeking approval of the water system concept of the initial service area, and appropriations to fund final engineering design, further testing of well sites, and possible land acquisition. This would begin the third year of activity.

Construction. At the beginning of the fourth year, the Board would seek appropriations from the voters for construction funds. In addition the Board would seek funding to provide for initial start-up operations.

Operation. Initial operations of the water system would typically have just begun at the beginning of the fifth year.

Identifying The Level of Service to be Offered

A public water system can provide two levels of service:

- domestic water service only, or
- domestic water service and fire protection flow capability

In order to develop a reliable cost estimate, for engineering, construction and operation, the level of service will need to be identified early in the process.

The offering of fire protection flows greatly increases the physical size of each component of the system and subsequently **increases the construction cost by 5-10 times** that of a system without fire flow capability.

Some components of a water system (e.g., sources and water storage tanks) may be initially constructed at a small size to minimize cost. However, if fire flows are ultimately planned, the distribution system piping must be installed at the proper size from the very beginning of the system's construction.

Identify The Area Which Would be Initially Served

In order to estimate the overall cost of developing a system and the per user cost, the area of initial service must be defined. Considerations when defining this service boundary include: a relatively compact area; low elevations relative to the elevation of the water storage tank; similar needs or similar motivation of proposed users such as addressing poor water quality or providing fire flows.

Defining How The Capital Cost will be Repaid

The Board of Commissioners or voters will need to determine how the bond repayment will be made. Critical decisions include: determining the portion of cost to be paid by industry or commerce and the method of apportioning the remaining cost among users. Typical apportionment methods include: betterment assessments using lot frontage, real estate assessment value, or exclusively by water use charges. Typical rate categories include: availability, fire flow service (hydrant rental), rates for minimal use and rates for normal usage. There are many reference books in this area that you can borrow.

Administrative Organization of a New District

The most recent districts established in New Hampshire are: Northwood Ridge in Northwood, Swain's Lake in Barrington, and Lochmere in Tilton. You may wish to contact these systems to obtain first hand knowledge of the legal, political, operational and public education aspects of establishing a district. We can provide contact information for these and other water systems.

Development of a Water System by the Private Sector

It is possible that one of the large, privately owned, water utilities in New Hampshire would be interested in developing, owning and operating a water system to serve your area. If that were to occur, their service fees and the area for which that they would receive a "franchise" would be regulated by the New Hampshire Public Utilities Commission. This is the same agency that regulates telephone, natural gas, and electric rates in New Hampshire. They can be contacted at 271-2431.

It is not likely that such a utility would invest in an area of sparse population with little potential for future residential or commercial growth. The major stockholder utilities in New Hampshire include:

Company	**Current Operating Locations**
Hampton Water Works Co	Hampton, NH and Salisbury, MA
Integrated Water Co	Barnstead and other areas
Pennichuck Water Co	Nashua and other southern NH areas
Consumers - NH Water Co	Hudson and other southern NH areas

Possible Sources of Funding

There are at least two government entities that might be able to offer financial aid to municipally owned water systems. This aid is typically predicated on the level of financial need that the proposed service area can document. This documentation is typically based on an income survey of the proposed users. You are welcome to contact these funding agencies directly.

Farmer's Home Administration	Community Development Block Grant
501 South Street	Office of State Planning
Concord, NH 03301	2.5 Beacon Street
226-9331	Concord, NH 03301 271-2155

Anticipated Benefits of a Public Water System

1. Lower fire insurance premiums maybe expected, particularly for large industrial, commercial or governmental buildings. This can often be an inducement to industry to help fund the capital costs of such a water system. Contact your insurance underwriter to determine the amount of savings that would be realized.
2. The availability of "off lot" water greatly simplifies the task of replacing a failed leach field or developing a lot since the setback requirements from wells no longer apply. A typical budget estimate for a new private well and pump is approximately $4,000.

3. There are a variety of natural and manmade water quality problems seen in private wells in "built up" areas of NH. These include salt, bacteria, oil spills, mineral radioactivity, radon, arsenic, fluoride, hardness, iron/manganese and corrosivity. These issues can be avoided with central water system.
4. Many wells have inadequate capacity, or "go dry" with the passage of time. A central system, avoid this problem.

Assistance from DES

DES would be pleased to help you evaluate your initial concept for a new water system. However, a consulting engineer would need to be hired after the district is formed to determine an accurate cost estimate and develop a detailed preliminary design. The agency maintains a roster of pre-qualified engineers in New Hampshire that are well versed in water system design.

TECHNICAL AND COST CONSIDERATION

The remainder of this document offers comments on how a water system is designed, how it functions and what are typical construction costs of water system facilities. This information is given so that a realistic understanding of the cost of water works construction can be gained. These cost estimates are for illustrating the magnitude of the possible costs **but can not be used for estimating needed appropriations or actual construction costs for a particular area.**

Components of a Water System

A water system has three principal components as shown below. The ability to develop these facilities at reasonable cost is based on site specific conditions such as topography and geology of the service area.

Supply source(s)
Storage tank(s) and
A system of pipes to convey the water from its source to where it will be used.

Sources of Water Supply

The essence of any water system is it source(s). A surface water supply (such as lake or river) is typically not feasible for a "start-from-scratch" system due to the very high capital and operational cost of the required full treatment plant.

Normally water would be supplied from one or more gravel packed or bedrock wells. Multiple sources are typically required to provide reliability. Such sources are not located at random but rather require the application of many technical methods to ensure the highest productivity and safest location. Gravel wells are typically located in areas of low elevation often near a river or pond in gravel aquifer area. A "test well" program is necessary to determine the most favorable locations for water supply wells.

Bedrock wells can be located in a wider variety of areas however, their output on average, is lower and their pumping cost are much higher. The expected output of a bedrock well can be improved by use of a scientific concept called "fracture trace analysis."

A budget estimate for a water supply well of 150 gallons per minute (gpm) and assuming purchase of sufficient protective land to meet regulatory requirements would cost in the magnitude of $200,000. The required pump station would be an additional cost.

A 25 gpm bedrock well for a very small water system with no fire protection with required land purchase could cost approximately $50,000. The pump station and storage tank(s) for the small system would be an additional cost.

Distribution Piping System

It will be necessary to identify the area to be served so that the cost of the distribution system can be estimated.

The distribution system must be buried to prevent freezing and to prevent damage from highway vehicles. The burial depth for New Hampshire is a minimum of five feet. The layout for the piping should be arranged to minimize dead ends and provide redundancy of piping over obstacles such as rivers, limited access highways and railroads etc. The cost of pipe installation will be lowest where there are sandy excavation conditions, little conflict with other utilities and where traffic safety issues are low. Piping cost will increase where bedrock is high, peat removal is necessary, water tables are high, and where existing pavement must be replaced or repaired.

A preliminary budget estimate for distribution piping, assuming an 8" diameter main, with little ledge excavation, and with on-line valves and hydrants and pavement replacement would be approximately $50 per lineal foot. Assuming a water system with an initial 5,000 linear feet of piping, the preliminary cost estimate for distribution system would be $250,000. For very small distributions systems with no fire protection and gravel roads a $20 per foot cost for piping is reasonable.

In addition, each home would need to be connected to the arterial pipe in the street. A budget estimate, for 75 feet of 3/4 inch tubing and a water meter and backflow preventer, per home, would be approximately $800.

Storage Tanks

For systems with fire flow, one or more large storage tank(s) are necessary. These tanks are normally located on a hillside or hilltop so that there is "gravity" flow during high usage periods. Such high usage situations include pipe breaks, fires flows, system flushing and mechanical or electrical failure. Such high elevations normally have high land costs and limited availability. A budget estimate for a 250,000 gallon water storage tank and purchase of hilltop land would be approximately $250,000.

For very small systems with no fire protection; the storage tank would typically located near the well at a low elevation. A cost of $20,000 is a reasonable estimate for such tankage.

For More Information

In summary, DES generally supports the benefits of having a Public Water System and can provide insights in the initial conceptualization of the proposal. For more information please call the DES's Water Supply Engineering Bureau at 271-3139. We would appreciate your comments concerning this fact sheet.